Cultivating Technological Human Resources in response to the Greening of the Iron and Steel Industry

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This study forecasts the future skills demand and introduces the desired direction in terms of the cultivation of the workforce in the steel industry. What's more, the analysis methodology utilized in this study can also be used to plan the direction for the cultivation of the workforce of other energy intensive industries and the manufacturing sector in general in the face of improvements in environmental performance, including energy efficiency.

This study reviews the likely job changes and workforce cultivation within the steel industry occasioned by improvements in environmental performance, including energy efficiency. All in all, a systematic approach to the review of the following clusters of environmentally sustainable technologies and techniques is adopted.

(1) Alternative fuels and resources
(2) Energy efficiency processes
(3) Recycling on an individual industry basis
(4) Environmentally friendly products
(5) Carbon capture and storage
(6) Environmental monitoring systems

This study forecasts the skills that will be required based on technology outlooks prepared in accordance with TRM by IEA scenarios, and shows how the skills composition ratio will change. Thereafter, the changes in the demand for related jobs and skills is deduced based on new technological area diagnostics created in conjunction with experts in related technologies, as well as experts in the fields of job analysis and training & education. Finally, on the basis of this outlook for changes in skills and jobs, a new overall direction for education & training is presented.

The desired direction of education & training is introduced below based on the difficulties associated with various technology and differentiation from existing technology.

1. Technology areas where the demand for new R&D workforce is high

This area, which can be likened to eco-friendly original-base technology, is one focused on R&D at the current level rather than commercialization, and includes hydrogen fuel(hydrogen production), coal chemistry and light weight material for structures. This particular area requires comprehensive consideration, such as international carbon emission regulation and the assesment of the economic situation, before actualization and commercialization can be brought about. The R&D workforce skilled in the pertinent technologies should be cultivated through related research projects conducted at the university level. There is a need for not only engineering departments directly related to the steel industry, such as material, metal, chemical and mechanical engineering, but also pure science departments, such as physics, chemistry and biology, to draw up plans to cultivate an elite workforce and bring about the long-term development of research.

2. Technologies where a high demand for new engineering & technical workforce exists

This area attracts the most attention in terms of the improving of the environmental performance of the steel industry. It includes alternative fuels and resources and high temperature dust collection. This technology area also contains currently emerging or actualized technologies for which active workforce cultivation is required, such as alternative fuels and eco-friendly post-processing. The forging of comprehensive ties to environmental engineering as well as fields more traditionally closely related to the steel industry, such as material, metal, chemical and mechanical engineering, has become very important. To this end, this requires converged education at the undergraduate level. There is a need to actively promote the opening of a steel-related subject within the pertinent departments and the improvement of the curriculum. In addition, government level support is also necessary.

3. Technologies expected to result in the greening of the existing R&D workforce

This area is one in which greening is being brought about by improving current technology levels through such means as energy efficiency, eco-friendly post-processing and eco-friendly products. Rather than fostering separate workforce cultivation plans, research development opportunities should be expanded, with existing researcher participating in this process. However, government supervision of the research that should be implemented at the enterprise level is not advisable; rather, entrepreneurs need to be the ones that propel advancements in research forward. For its part, the government is expected to promote on-offline forums through which researchers in private companies can have systematic and prompt access to the necessary information.

4. Technologies related to the greening of the existing engineer & technical workforce:

Closely related to the greening of the cement industry, this area constitutes the technology area where the demand for new engineers & technical workforce, as well as the re-education/training of the existing workforce, is the highest. The technologies in this area are designed to achieve greening via the application of technologies ranging from energy efficiency to eco-friendly products, and include the use of steel slag as an alternative to limestone, high efficiency coolers, waste heat generation, and chloride by-pass systems. The ability to induce flexible responses to such fast technological developments will require not only training & education, but also the rearranging of related certificates.